5. Decision Support Criteria and Guide System of Environmentally Sound Technologies for Sustainable Regional Management

持続可能な地域管理のための環境技術の評価と政策決定プロセスへ適用するガイドシステムの提案

Tsuyoshi FUJITA Tohru MORIKA

藤田 壮*・盛岡 通**

ABSTRACT; Integrated regional governance and management to attain the global and local environmental targets have caught significant attentions for regional policy makers, planners, engineers and citizens in Asian Metropolises which are projected to have major portions of global economical growth in the century, as well as in Japan. Indicators, Criteria for Environmentally Sound Technologies for assessing and evaluating environmental technologies are expected to be exceedingly effective for planning and management systems to regenerate Japanese cities and regions as well as growing Asian metropolitan regions. Based on consecutive international workshops directed by UNEP/IETC(International Environmental Technology Center), the key process for EST guidelines were tentatively identified

KEYWORDS; Sustainable Regional Management, Environmentally Sustainable Technologies, UNEP/IETC, Policy Options, Environmental Indicators

1. BACKGROUNDS

Regions consist of various types of spatial spheres such as urban areas, agricultural areas and natural forestry areas, where natural resources, agricultural goods and industrial products support human activities. Intensive human activities located in urban areas, at the same time, generate enormous amounts of wastes and emissions that spill over the urban boundaries and affect both surrounding terrestrial and ocean spheres as well. Region is considered as a suitable terrestrial and aquatic scale to demonstrate sustainable regional governances that integrate water resource management, wastewater treatment, and solid waste.

Integrated regional governance and management to attain the global and local environmental targets have caught significant attentions for regional policy makers, planners, engineers and citizens in Asian Metropolises which are projected to have major portions of global economical growth in the century, as well as in Japan. Indicators, Criteria for Environmentally Sound Technologies for assessing and evaluating environmental technologies are expected to be exceedingly effective for planning and management systems to regenerate Japanese cities and regions as well as growing Asian metropolitan regions. Based on consecutive international workshops directed by

---

*Professor of Toyo University(2100 Kujirai Kawagoe City Saitama, 350-8585, Japan)　東洋大学工学部環境建設学科

** Professor of Osaka University (2-1 Yamadaoka Suita City Osaka, 565-0871, Japan)　大阪大学工学研究科環境工学専攻

UNEP/IETC(International Environmental Technology Center), the key concepts and EST guidelines for sustainable regional management are discussed in this paper. First, authors made a comparative survey of several scenario driven policy approaches. Secondly discussions through international workshops on EST guidelines in sustainable regional management are summarized. Finally tentative proposal for EST guidelines are identified. .

2. SURVEY ON SCENARIO BASED PLANNING APPROACHES

The Scenario Approach is focused as an effective tool that gives better information to decision-maker. Modelling, forecast, projection and prediction and analysis are able to support decision making based on current condition or existing data to extract the rate of following future. The Scenario Approach is to compensate for the limits of modelling and gives creative ideas to us and draws several plausible futures.

In the last decade, there have been different efforts to develop global scenarios in GEO3, WWV, WBCSD, MA. There are two patterns to develop the scenarios. One is exploratory scenario that draws the trend of future by exploring the current condition. The other is anticipatory scenario that draws the future vision at first. And scenarios are classified into qualitative scenario that includes qualitative information and draws story line, and quantitative scenario that applies quantitative data and calculates with models. The common scenarios contain a description of step-wise change, driving force, base year, time horizon and time steps, and storyline.

2.1 Millennium Ecosystem Assessment(MA)

In MA, scenarios were developed for a 50-year time horizon that connect possible changes in unpredictable, uncontrollable drivers with human demands for ecosystem services and, in turn, to the futures of the ecosystem services themselves and the aspects of human welfare that depend on ecosystem services.

The Scenarios address ecosystem goods, ecosystem services, impact on human well-being. The scenarios in MA are developed a general qualitative storyline supported by quantification. This scenario types can be combined to develop internally consistent storylines based on quantification and models, which are then disseminated in a narrative form.
The scenarios address possible change under the unpredictable, uncertain, uncontrollable conditions.

Some of the ambiguous and uncontrollable drivers that might be considered include governance, economic globalization, climate, or emergence of disease. For example, scenarios could consider the implications of increasing interconnectedness of economies at the global scale. How will such global economic changes affect the capacity of ecosystems to produce food and fiber, provide freshwater, and sustain biodiversity? What are the impacts of these ecological changes for alleviation poverty? And what are the implications of changes in human welfare for ecosystem goods and services? Such feedbacks are at the heart of MA scenarios.

2.2 The scenario in World Water Vision (WWV)

The World Water Vision process has used mostly qualitative scenarios to help people think about future water worlds. The World Water Council (WWC) developed three qualitative scenarios. Scenarios described about future water world and water stress and trends between 2000 and 2025. The global three qualitative scenarios developed alternatives about water worlds in many sectors (ex: Water for Food, Water for People, Water and Nature, Water in Rivers)   and regional groups. And these scenarios were the starting point for several model-based simulations of specific components of the water resource management system.

Scenario evolved in four rounds. The four rounds is Development⇒Discussions⇒Feedback⇒ Subsequent improvement. The approach deliberately focused on development of qualitative scenarios, initially, to allow incorporation of the many social, economic, environmental and cultural factors that

play a major role in shaping the water future, but may not be modeled quantitatively. The major drivers propelling the global water scenarios pertain to the following clusters: Demographic, Economic, Technological, Social, Governance, Environmental.

The end point of the scenario is an image of the future situation resulting from the unfolding of the scenario.

The development and discussion of qualitative scenarios served as a platform for consultation among many stakeholders form different disciplinary backgrounds and different stakeholder perspectives. Models were used subsequently to analyze the consistency and coherence of the qualitative scenarios, explore some of the (partial) consequences and help fill in some of the gaps.

Three Qualitative Scenarios

- Business as usual (BAU) --a continuation of current policies and extrapolation of trends.
  The Business-as-Usual (BAU) scenario describes a world in which current policies on water resources management and development are continued in essence unchanged; global water crisis may occur, but even if it does not, water is not used sustainability and regional crises do occur.
- Technology, economics, and private sector (TEC) --private sector initiatives lead research and development, and globalization drives economic growth, but the poorest countries are left behind
  The Technology, Economics, and the Private Sector scenario (TEC) is characterized by a world view that is optimistic about the free market system, the potential of new technologies and the possibilities to regulate or limit the undesirable side effects of both.
- Values and lifestyles (VAL) --sustainable development, with an emphasis on research and development in the poorest countries.
  The Values and Lifestyles (VAL) scenario assumes that a strong commitment to avert a water crisis will emerge early in the new century, with efforts focused on reaching a set of global and regional targets. The emphasis is on a revival of the fundamental human values and changes in lifestyles in accordance with them.

2.3 The scenario in World Business Council for Sustainable Development (WBCSD)

The scenarios are designed for the future from 2000 to 2050, to stimulate broad discussion on the challenges of sustainable development for business and to provide a platform for more focused industry and corporate scenarios incorporating local business issues. These focused scenarios, in turn, will provide a useful stimulant for the review of existing strategies and the creation of new ones.

If business can respond to people's needs with humanity and responsibility, it can shape the world of the 21st century. The scenarios were dedicated to those who wish to explore the future and challenge their understanding of how the world might unfold. The scenarios were developed in following step.

- To clarity about the overall focus or theme.
- To identify the main areas of required research and to gather information.
- To identify and analysis driving forces
- To contemplate a set of plausible storylines and product global scenarios.
- To build focused industry or corporate scenarios.

The variation in human response in varying ways to the challenge of sustainable development means that the branching point of the scenarios-what differentiates them from one another-lies not so much in the ecosystem or in the social system, but with us. The variation developed three scenarios. such as FROG scenario, GEO polity scenario, Jazz scenario. FROG, or First Raise Our Growth scenario ignores our social and environmental problems, trusting in the dynamic of economic growth and the innovations of technology. GEOpolity scenario presumes that we turn away from our ineffective institutions of government and business to seek new models of governance—a GEOpolity—that will take into account the religious and democratic values our narrow economic myth seems to ignore. Jazz scenario presumes that the society try to embody our growing environmental and social values within the economic myth and like Jazz players, experiment with ad hoc alliances and

innovative forms in a world where the way we "play" and everything else we do is open for everyone to see and judge.

3. ENVIRONMENTALLY SUSTAINABLE TECHNOLOGY GUIDELINES FOR REGIONAL MANAGEMENT

International Environmental Technology Center of UNEP has held a series of expert meetings and international symposiums on assessing and evaluating environmentally sound technologies in the focal fields of regional managements such as energy, land-based transportation, water resource management and construction wastes. International seminar on environmentally sound technologies in Osaka, Japan, 5-6 March 2002, provided a comprehensive framework of assessment and evaluation consisting of global and generic assessment components and site-specific assessment components.

Chapter 34 of Agenda 21 defines environmentally sound technologies as technologies which "protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they are substitutes". Agenda 21 also contains several other important statements to guide interpretation of this definition with emphasis on facilitating the accessibility and transfer of technology, particularly in developing countries, as well as the essential role of capacity building and technology cooperation in promoting sustainable development. It states that "new and efficient technologies will be essential to increase the capabilities, in particular of developing countries, to achieve sustainable development, sustain the world's economy, protect the environment, and alleviate poverty and human suffering. Inherent in these activities is the need to address the improvement of technology currently used and its replacement, when appropriate, with more accessible and more environmentally sound technology".

While providing the basis for defining ESTs and pursuing technology transfer at the global scale, Agenda 21 is to be implemented by nation states through the development of national sustainability plans and Local Agenda 21 plans. Ideally, these plans would provide the policy context for assessing and verifying technologies that claim to be environmentally sound or sustainable. In addition, the implementation of Agenda 21 must take into account the role of technology development in achieving inter- and intra-generational equity within a population and across nation states, particularly in the alleviation of poverty. Hence there is a need for democratic processes in the development, selection and management of technologies that are more environmentally sound and based on sustainable resource utilization.

Assessing and evaluating ESTs involves the application of various assessment approaches and management tools. The selection of the most appropriate tools for a given assessment depends on the nature of the technology and the capacity of decision-makers and stakeholders to understand and apply these tools. It also involves determining the scope and boundaries of the assessment, and understanding the differences between stand-alone technologies that might be assessed under ideal operating conditions, and integrated technologies that should be assessed as part of a larger, more variable system or development.

Figure 1 shows the classification of assessment tools mainly between those for global / generic scope and local and application scopes.

4.TENTATIVE PROPOSALS FOR EST ORIENTED REGIONAL MANAGEMENT

An expert workshop among Dr. Steve Halls, Executive Director of IETC, and Asian professors in the field of regional and environmental management was held to bring a vital progress for the sustainable regional management in Asian Regions on February 11th, 2003 in Shimizu City, Japan. The open-symposium was also held by UNEP/IETC and Japanese environmental organizations including GEC, Ministry of Environment and academic research institutes. Professor Hanaki, Keisuke(Tokyo University), Dr.Moriguti, Yuichi (National Institute of Environmental Studies),
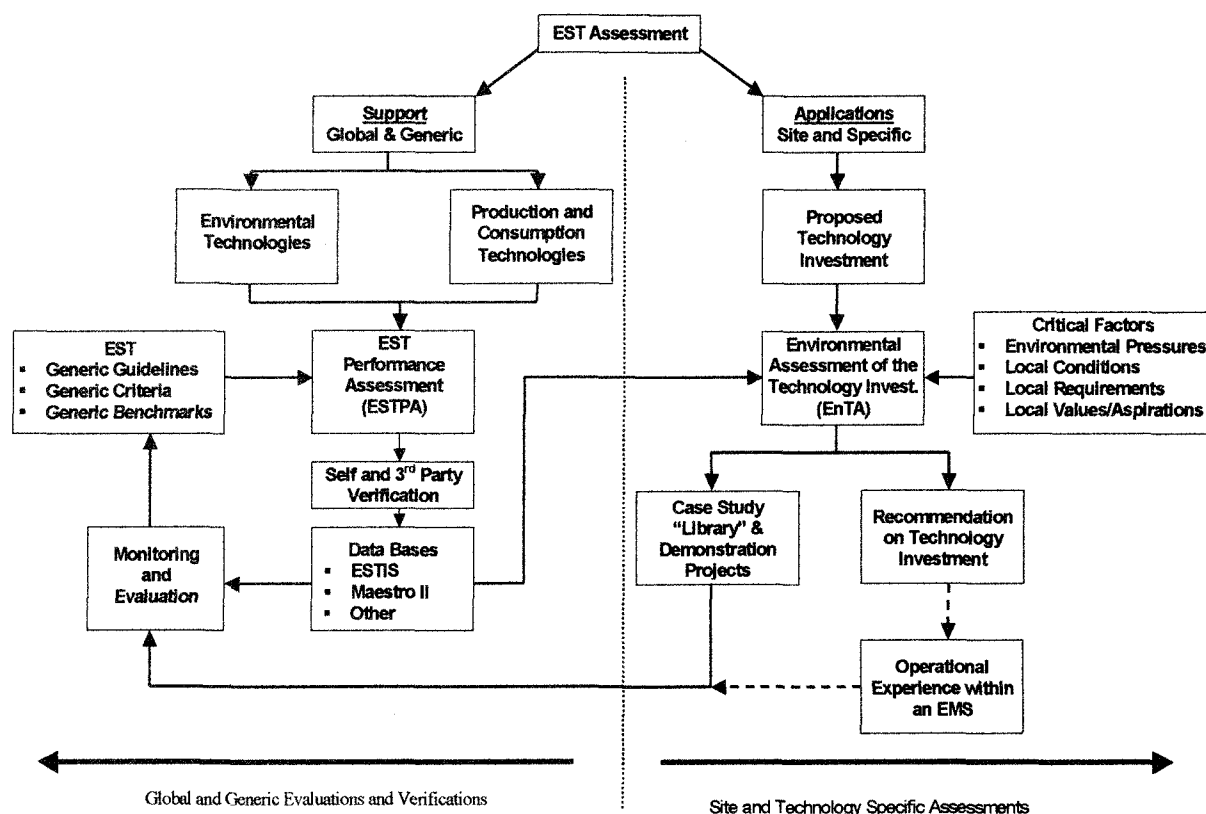
Figure 1   EST Assessment at the Generic/Global Scope and Application/Local Level Scope

Professor Shun Fung Chiu (International Consultant in Asia-pacific region on Cleaner Production System) and Associate Professor Fujita, Tsuyoshi (Osaka University) joined the workshop.

The following are tentative agreed points among participants

1) Existing Obstacles for Applying EST

The key barriers to apply ESTs compared with conventional technologies are lack of information, lack of finance, appropriate policies of EIP in regions to meet needs, strategy for value added approach, EST roles to stimulate regional management

2) ST rather than EST

The focus should be expanded toward Sustainable Technologies rather than Environmentally Sustainable Technologies. From this context, economic and environmental benefits are equally important as well as social benefits, which are to be considered as the extensive criteria compared with other two categories.

Indicators to promote the adoption of conventionally expensive technologies are important. EST helps improve people's lives and environment, with various priority policy fields including water, waste, construction, while POVERTY should be faced with first priority.

3) Identification of Baseline Criteria Group such as MFA

Baseline criteria group should be defined, which are common among countries on different economic stages and which should be useful for the baseline indicators to evaluate environmental impacts and economical impacts as well as social impacts. Material Flow could be considered as the base criteria, which is evaluated in regional and urban scale in addition to macro-national scale.

4) Clustering of Regions

To apply generic indicators, different estimation process should be provided for countries of different economic stages, environmental states, and levels of infrastructure developments and responsive policy adoptions. Statistical clustering for 50 metropolitan Asian regions are to be suggestive. Discussions brought the following tentative clustering. clustering perspectives. A) Drivers such as GDP, Income, industrial structures, urban population density imports and exports. B) States;
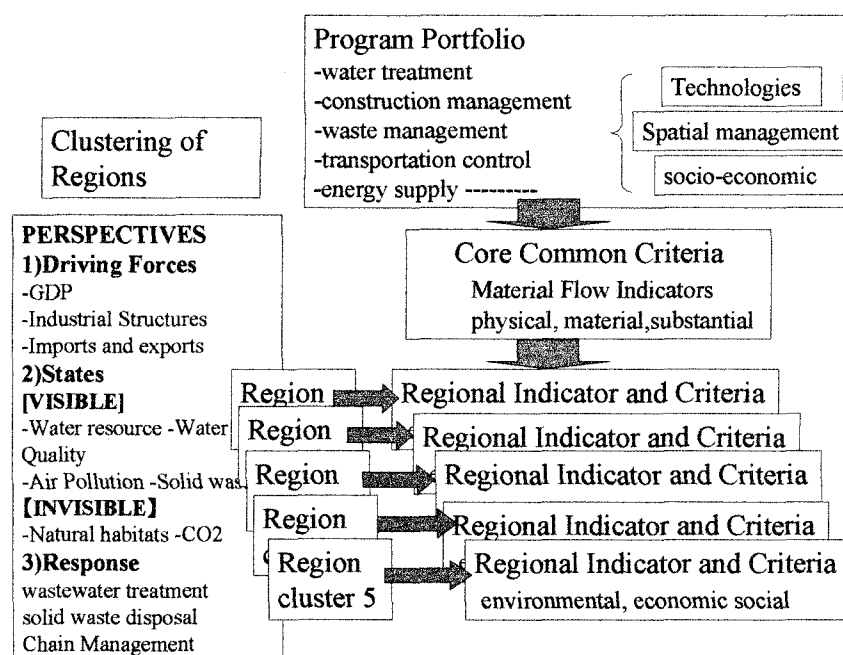
Figure 2 Clustering Regions and Program Portfolio

fresh water resources, river water quality, ocean water quality, air pollution, solid wastes. natural habitats (forests, wetland, bay-area). C) Response; Wastewater treatment facility and coverage, solid waste incineration and disposal plants, product chain management policies; consumption, design and manufacturing

5) Portfolio of Environmental Technologies and Socio-economical policy programs

Rather than treating End-of-Pipe technologies as single independent solutions, combination of technologies with economical management, spatial land use management, financial subsidization, and societal control programs are designed as portfolio for the sustainable regional management.

Based on experts' discussions, the consequential procedures for EST guidelines were tentatively identified.

1) Clustering Nations and Regions for the structural basement to apply core and generic system on local considerations.

2) Selecting the priority portfolios of the combination of technologies

3) Core and generic assessment tools such as MFA and other physical estimations for basic environmental medias.

4) Schematic Processes to apply generic criteria on local and regional management and evaluation system of economical and social criteria

Participation and Contribution in International Symposium for ESTs in Water Management and Constructions in Perth, Australia, September 2003.are also discussed

NOTE   This paper is based on the contribution of Global Environmental Center Foundation.

References

UNEP/IETC Expert Group on Environmentally Sound Technologies Assessing and Evaluating Environmentally Sound Technologies: A Summary, 2002

MA, Millennium Ecosystem Assessment Methods, 2002.

MA, People and Ecosystems: A Framework for Assessment and Action Second Review Draft -- Not for Citation or Quotation,2002.

World Water Council; World Water Vision~Making Water Everybody's Business,2000

Frank R. Rijsberan (ed.);World Water Scenarios : Analysis Working Draft, 2000.

WBCSD; Exploring Sustainable Development~WBCSD Global Scenarios 2000-2050 Summary Brochure,1997